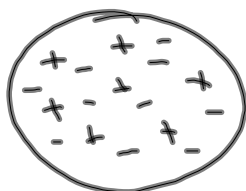


- Early Atomic Models:

- Plum pudding:

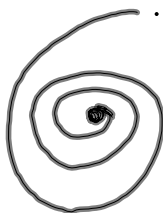


Rutherford's gold foil exp.
would have given different
results if this were how
atoms existed

- Bohr model:

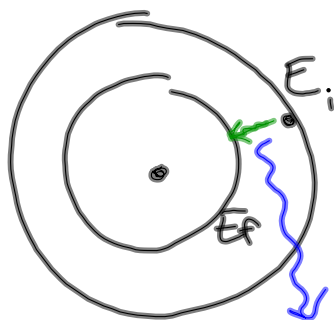
Solid core (nucleus)
with electrons orbiting

- Why don't e^- spiral
into the nucleus?



- Assumptions of the Bohr model:

- Electrons are only allowed to orbit at certain distances from the nucleus. While in these orbits they don't emit light.
- Electrons emit light only if the transition to a lower orbit.

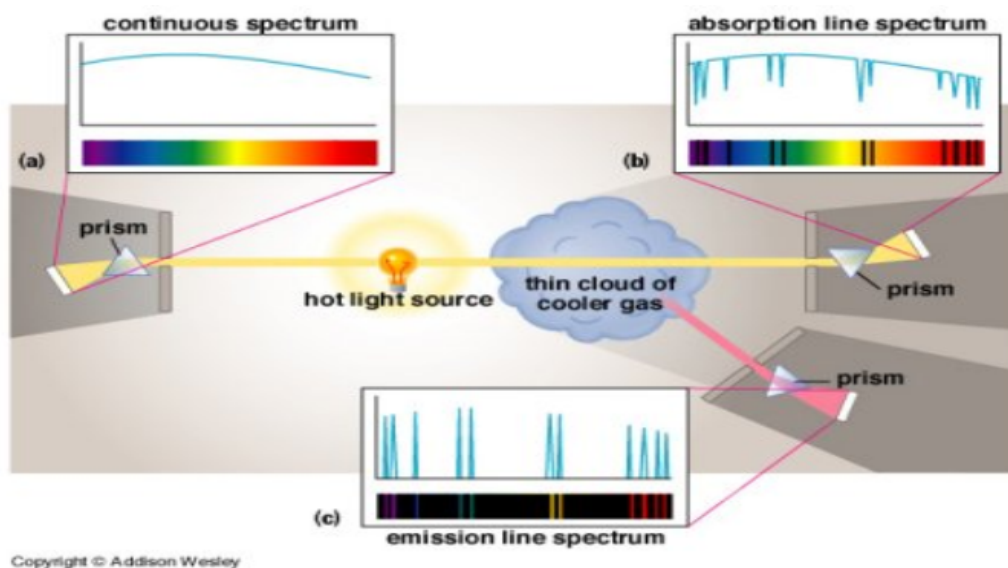


energy of released light equal
to the difference in energy

$$hf = E_i - E_f$$

- Electrons can absorb energy only if it the exact amount to go to a higher allowed radius

Absorption and Emission Spectra:



- Atoms/molecules require different energies to cause orbital shifts of e^- . So, each has a unique "signature."

Hydrogen Absorption Spectrum



Hydrogen Emission Spectrum



• More Bohr model:

– Allowed radii:

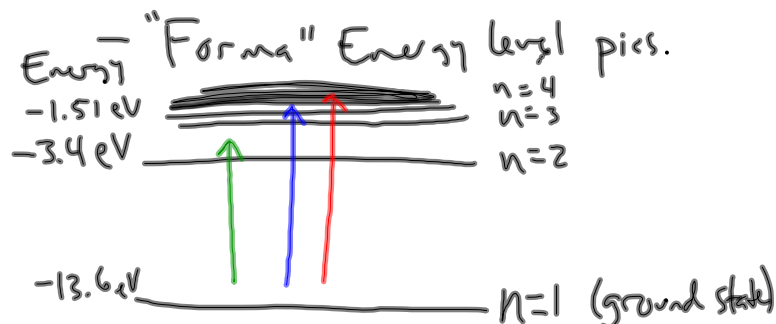
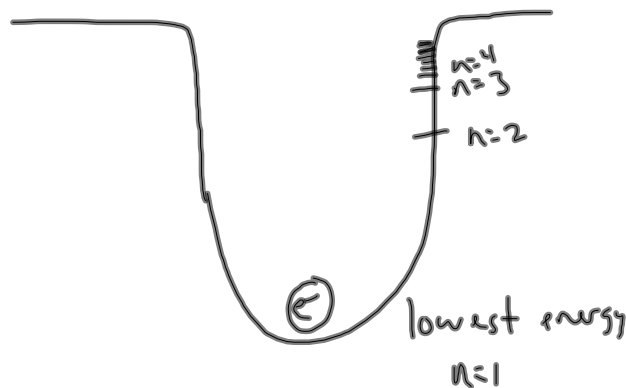
$$r_n = n^2 a_0 \quad n=1,2,3,\dots$$

$$a_0 = 0.0529 \text{ nm}$$

– Allowed energy levels

$$E_n = \frac{-13.6 \text{ eV}}{n^2} \quad n=1,2,3,\dots$$

– Think of electron at the bottom of a pit, and it needs energy to leave



Failures of Bohr model:

- Does not generalize to atoms with many e^-
- Wrong in the assumption that e^- are particles \rightarrow corrected by de Broglie a few years later

